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Studies on Anaemia in Pigs

2.—Comparison of Haemoglobin Levels in Blood of Pigs Reared Indoors and Outdoors on Pasture

BY

R. S. BARBER, R. BRAUDE and K. G. MITCHELL
National Institute for Research in Dairying, University of Reading

BARBER, Braude & Mitchell (1953) observed a fall in blood haemoglobin in three five-week-old suckling pigs reared indoors, in spite of daily oral dosing with iron pyrophosphate during the second week of life.

In order to confirm this observation and to study its physiological implications a preliminary test was carried out in which the haemoglobin levels were studied throughout the suckling period in litters reared either indoors or outdoors on pasture. The outdoor litters were included since it is generally recognised that under such conditions of rearing anaemia does not normally develop.

Experimental

Treatments

1. *Indoor reared pigs.* Three litters comprising 32 pigs were used. The pigs farrowed indoors and remained there until weaned at eight weeks of age. For seven consecutive days, starting on the fourth day of life, each pig was given once daily 2 ml. of iron pyrophosphate solution by mouth, providing 30 mg. of Fe.

This treatment represents the routine procedure adopted at Shinfield for several years against anaemia in indoor reared pigs. It differs from that recommended by Foot & Thompson (1947) in that the dosing commenced on the fourth instead of on the seventh day of life. This change in routine was made following the work of Draper & McElroy (1949), suggesting that earlier dosing was more effective.

2. *Outdoor reared pigs.* Four litters comprising 40 pigs were used. Each litter was born indoors and on the fourth day of life was taken outside into a portable fold unit with grass run attached, in which it remained until weaned at eight weeks of age. The fold units were moved daily on to fresh ground. No iron was administered to the pigs.

From the 14th day of life, both indoor and outdoor reared litters had unrestricted access to a good quality creep meal and to water; the amount of creep meal consumed daily by each litter was determined and the pigs were weighed once weekly. The test was carried out during the summer of 1954.

Haemoglobin determinations

The haemoglobin content of the blood of each pig was determined on the fourth and seventh day of life and thereafter weekly up to eight weeks of age. The fourth day determination was made before the administration of iron to the indoor reared pigs and before the outdoor reared litters were moved into the fold units. The haemoglobin determinations were made by the method previously described (Barber *et al.*, 1955).

Results and Discussion

The data relating to the mean blood haemoglobin levels and live-weights of the pigs reared indoors and outdoors are given in Table I and are shown graphically in Figs. 1 and 2. Table II shows the mean weekly consumption of creep meal per pig in the indoor and outdoor reared litters.

grow at an appreciably greater rate so that at weaning their mean weight was 7.3 lb. higher than that of the litters reared inside.

The data in Table II show that only very small

TABLE II
MEAN WEEKLY CREEP MEAL CONSUMPTION PER PIG IN INDOOR AND OUTDOOR REARED LITTERS. (LB.)

	Week of life					
	3rd	4th	5th	6th	7th	8th
Indoor reared litters	0·2	0·3	0·7	1·5	3·1	5·9
Outdoor reared litters	0·0	0·4	0·9	3·2	5·2	9·5

amounts of creep meal were consumed by the pigs in both indoor and outdoor litters up to about the fifth week of life. Consumption then began to rise steadily, particularly in the outdoor reared litters, the average amount of creep meal eaten per pig in these litters during the eighth week of life being 9.5 lb. compared with 5.9 lb. per pig in the indoor reared litters.

The failure of the indoor reared pigs to eat significant amounts of creep meal until the last week or two of the suckling period indicates that during the period

TABLE I
MEAN HAEMOGLOBIN CONTENT OF THE BLOOD (G./100 ML.) AND LIVE-WEIGHT (LB.) OF INDOOR AND OUTDOOR REARED PIGS

	Treatment	Number of pigs	Age of pigs in days								
			Birth	4	7	14	21	28	35	42	49	56
Haemoglobin	Indoor reared	32	—	9·27	9·89	11·26	10·16	8·80	8·44	8·25	8·40	8·62
	Outdoor reared	40	—	10·07	8·54	9·80	11·00	11·65	11·82	12·01	11·83	11·97
Live-weight	Indoor reared	32	2·9	—	5·4	9·1	12·7	16·0	19·2	22·5	26·4	32·3
	Outdoor reared	40	2·9	—	5·7	9·2	12·8	16·6	20·4	25·8	31·9	39·6

It is seen that a marked secondary decline in the haemoglobin levels of the indoor reared pigs was again apparent, although the decline commenced during the third instead of during the fourth week of life as occurred previously (Barber *et al.*, 1955). This earlier decline was probably associated with the earlier start of oral dosing in the present experiment. The secondary fall in haemoglobin continued until the seventh week of life, when a slow recovery started, which continued until the end of the suckling period.

The results obtained with the pigs reared outdoors were markedly different. While taking a little longer to recover from the initial fall in the haemoglobin level after birth than the dosed indoor reared pigs, the haemoglobin content of the blood of the outdoor reared animals continued to rise steadily until it reached a level of approximately 12.0 g. haemoglobin per 100 ml. of blood during the sixth week of life. This level was then maintained for the remainder of the suckling period.

The live-weight gain figures in Table I show that up to three weeks of age, the growth of the indoor and outdoor reared animals was practically identical. From this age onwards, however, the latter began to

from the end of iron dosing until the sixth or seventh week of life the daily intake of iron by the pigs must have been small. The National Research Council (1950) suggest a dietary requirement for the pig of 15 mg. of iron per day during the first three weeks of life in order to maintain normal haemoglobin levels. The amount of iron provided by sow's milk is probably of the order of 1.0 mg. per day per pig, so that on the basis of these figures a deficiency of some 14 mg. of iron per day existed for each suckling pig.

The creep meal used in the present work contained approximately 80 p.p.m. of iron, so that each pig would have to consume roughly 0.4 lb. of this meal per day, or nearly 3 lb. per week in order to provide the dietary requirement of 14 mg. of iron per day. The data in Table II show that it was not until the seventh week of life that the indoor reared pigs were consuming this amount of meal. While the above figures are based on several assumptions and cannot be considered as more than a very general guide, they do suggest that the secondary fall in haemoglobin levels of the indoor reared pigs was probably a simple reflection of the pattern of creep meal consumption by these animals.

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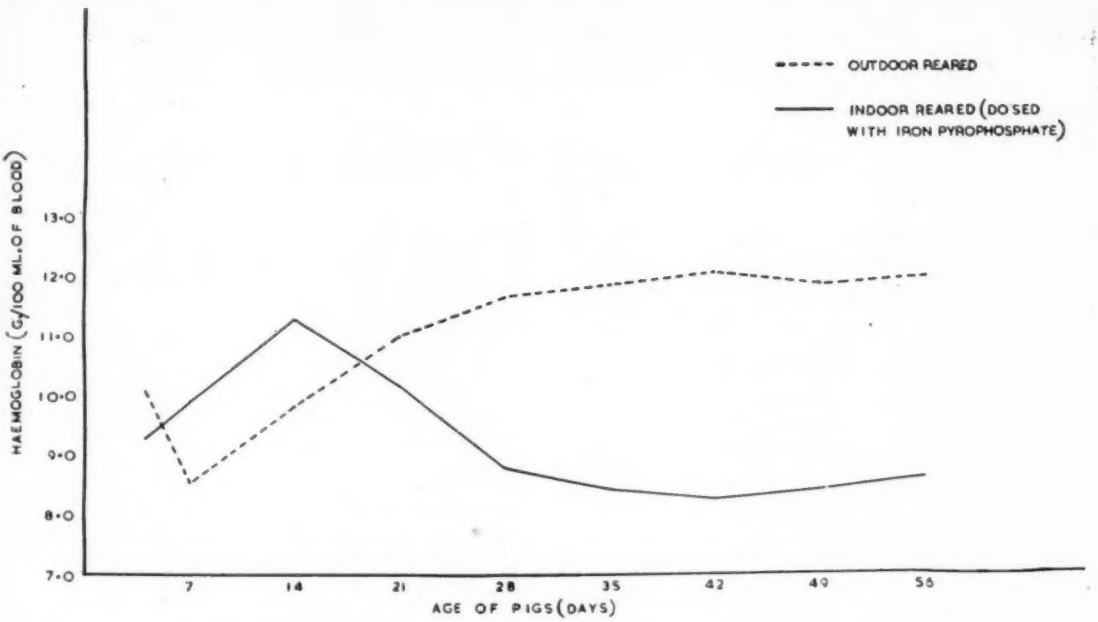

FIG. 1.—Haemoglobin levels in blood of indoor and outdoor reared pigs.

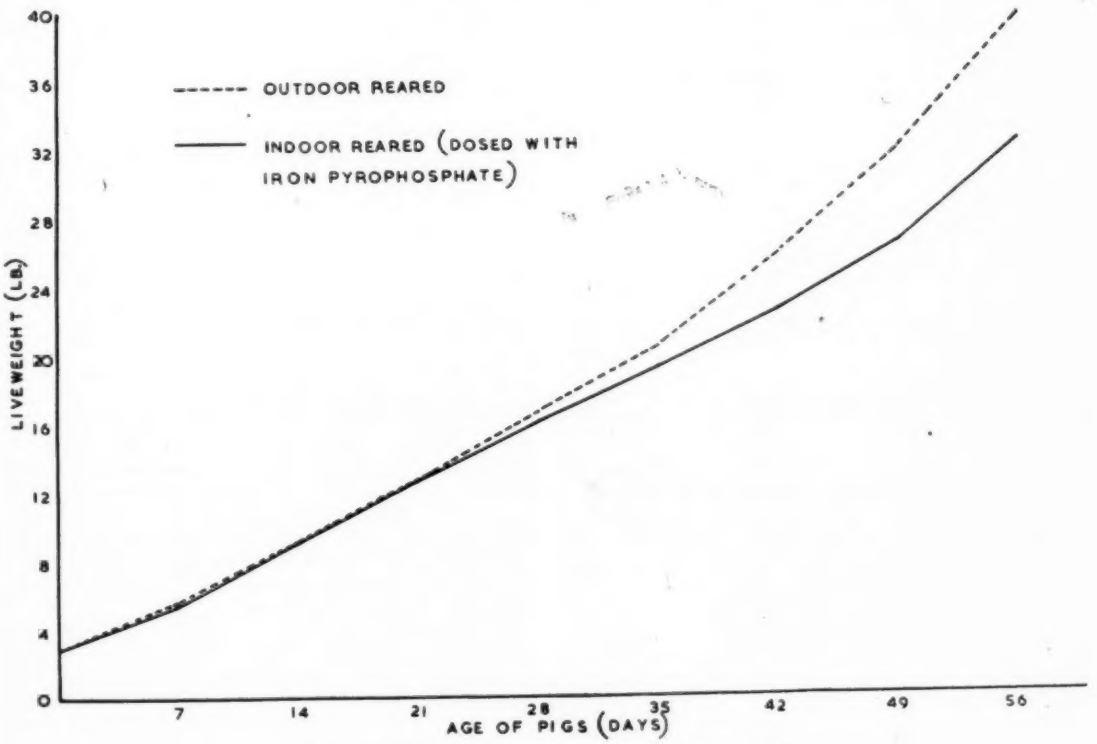

FIG. 2.—Growth curves of indoor and outdoor reared pigs.

Brucella abortus: Heat Stable Protective Antigen Revealed by Adjuvant and Present in a "Rough" Variant, Strain 45/20: Immunisation Experiments on Guinea-pigs

BY

A. D. McEWEN and J. McA. SAMUEL

Moredun Institute, Gilmerton, Edinburgh

LIVE (1949) examined the immunising properties of two adjuvant vaccines each prepared from an ether-killed culture of a CO_2-sensitive, virulent strain of *Brucella abortus*, and concluded that absorption on alum, or combination with a mineral oil and Falba improved the vaccine. Of the two adjuvants the mineral oil and Falba was the better when the immunity of the guinea-pigs was challenged by the inoculation of live organisms 10 or more months after vaccination. Thus, 18 out of 21 animals that received the vaccine in oil resisted infection whereas only 8 of 20 given the alum-treated vaccine were resistant. Gwatkin & Dzenis (1952) injected groups of guinea-pigs with four different vaccines prepared from a recently isolated CO_2 sensitive strain of *Br. abortus*. The vaccines were: (1) heat-killed culture emulsified in mineral oil and Falba; (2) heat-killed culture in saline; (3) ether-killed culture in mineral oil and Falba; (4) ether-killed culture in saline. When the resistance of the animals was challenged by the inoculation of virulent culture, six out of 15 given the heat-killed vaccine in oil and five of 10 given the ether-killed vaccine in oil were resistant; those that received vaccines in saline were less resistant. Their results indicate an adjuvant action by the oil irrespective of whether the organisms were killed by heat or by ether. Later Gwatkin & Dzenis (1952b) injected groups of guinea-pigs with three different adjuvant vaccines. An ether-killed culture of a CO_2-sensitive virulent strain and the same mineral oil were used for each vaccine, but different emulsifying agents were tested. These were Arlacel A, Arlacel B and Falba. The vaccine containing Falba was probably the best, 8 of 17 vaccinated animals resisting an inoculation that infected all of 20 controls.

Guinea-pigs do not appear to have been used in comparisons of the immunising properties of heat-killed adjuvant vaccine, and live vaccine in saline prepared from a strain of reduced virulence. Nor has advantage been taken of adjuvants in comparing the immunological properties of killed cultures obtained from strains of different degrees of virulence. The present paper reports the results of such comparisons.

Methods

Three strains of *Br. abortus* were used:—

1. Strain 45 of very low virulence for guinea-pigs (McEwen & Roberts, 1936) and cattle (McEwen, 1937). The strain is agglutinogenic.

(2) Strain 45/20 of reduced virulence and not agglutinogenic for guinea-pigs (McEwen & Priestley, 1938). It neither causes infection nor the stimulation of agglutinins on inoculation into non-pregnant cattle (McEwen, 1940, 1941, and 1946; Taylor & McDiarmid, 1949).

(3) Strain 544 a CO_2-sensitive, virulent strain (McEwen, Priestley & Paterson, 1939).

At the time the experiments started the three strains had been preserved for many years in the dry state. The second generations from the dried cultures were used in the preparation of vaccines and for the challenge inoculations of live culture (Strain 544). Forty-eight-hour growths on liver agar were washed off with saline and standardised to the required opacity. When killed cultures were used suspensions of the organisms were killed by steaming for one hour.

Liquid paraffin leve B.P. four parts and Falba one part was the adjuvant. An adjuvant vaccine consisted of one volume of a suspension of killed organisms emulsified in four volumes of the adjuvant. Guinea-pigs injected with an adjuvant vaccine received 0·2 c.c. subcutaneously. Vaccines in saline, whether containing

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It is interesting to note from the curves in Figs. 1 and 2 that the period of more rapid growth in the outdoor litters coincided exactly with the period when their haemoglobin blood levels were appreciably higher than those of the indoor reared animals.

The better growth of pigs kept outside on pasture in this experiment confirms the results obtained previously (Barber, Braude & Mitchell, 1953, and unpublished data). Access to soil and actively growing vegetation appeared to be the primary factors responsible for the better performance of the outdoor reared animals in this earlier work; in the light of the present results, it would seem likely that this difference in growth between indoor and outdoor reared litters was, at least in part, the direct result of the continuous supply of iron, present in the soil and vegetation, to the litters reared outside.

Work is now in progress in which the haemoglobin content of the blood of indoor reared pigs is being kept at a level comparable to that of outdoor reared animals by the more frequent administration of iron. In addition, the possibility of increasing the consumption of creep meal, particularly in the early part of the suckling period, as a means of preventing the secondary fall in blood haemoglobin is being studied.

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living or killed organisms, were of an opacity equivalent to Tube 3 of the Brown's Scale ; guinea-pigs were given 1 c.c. subcutaneously. The number of bacteria in an injection of either the vaccine in saline or the adjuvant vaccine was the same.

The immunity of vaccinated guinea-pigs was challenged by the subcutaneous inoculation of 1 c.c. of an appropriate dilution of a 48-hour liver agar culture standardised to the opacity of Tube 3 of the Brown's Scale. Challenge inoculations were made in a region of the body far removed from the site of vaccination. Serum agglutination tests were made with Weybridge standard antigen. Spleen tissue was inoculated on to liver agar. Ten per cent. suspensions of spleen tissue were prepared and inoculated on to plates and large liver agar slopes. Disintegrated spleen tissue was sown on to large liver agar slopes. Cultures were examined after four and again after six days' incubation.

Results

Experiment 1.—*The comparison of Strain* 45/20 *living vaccine in saline, Strain* 45/20 *heat-killed adjuvant vaccine, and Strain* 544 *heat-killed adjuvant vaccine.*

TABLE I

Dilution of infective dose	Number of guinea-pigs	Average spleen weight in grammes	Number of guinea-pigs with serum agglutination titres over 1 : 20	Number of spleens positive in culture	Number of spleens not infected
			45/20 in saline living vaccine		
10^{-7}	12	1·0	4	4	8
10^{-8}	12	0·97	2	3	9
			45/20 adjuvant vaccine (reduced virulence non-agglutinogenic strain)		
10^{-7}	12	1·0	2	3	9
10^{-8}	12	0·97	0	0	12
			544 adjuvant vaccine (virulent agglutinogenic strain)		
10^{-7}	12	0·9	12	2	10
10^{-8}	12	0·98	10	0	12
			Controls		
10^{-7}	12	2·1	11	10*	0*
10^{-8}	12	1·31	8†	10	2

The infective dose was inoculated eight weeks after vaccination.

The guinea-pigs inoculated with 10^{-7} dilution of live virulent culture were killed eight weeks later, and those infected with dilution 10^{-8} were killed 9 to 11 weeks later.

* The spleen tissue from one guinea-pig was not cultured.

† Nine sera only were tested.

Experiment 1 indicates (1) that a killed adjuvant vaccine prepared from a strain of low virulence affords as good or better protection than does a living vaccine of the strain in saline, and (2) a killed adjuvant vaccine made with a non-agglutinogenic strain of low virulence stimulates as high a resistance to infection as does a killed adjuvant vaccine made with a virulent strain.

Experiment 2.—*The comparison of three killed adjuvant vaccines prepared from the strains of different levels of virulence and a killed vaccine in saline prepared from a virulent strain.*

The adjuvant vaccines were made from Strains 45, 45/20, and 544. The vaccine in saline was made from the virulent strain 544.

TABLE II

Dilution of infective dose	Number of guinea-pigs	Average spleen weight in grammes	Average agglutination titre	Number of spleens positive in culture	Number of spleens not infected
			45 adjuvant vaccine (very low virulence agglutinogenic strain)		
10^{-7}	10	1·8	702	5	5
10^{-8}	10	1·4	302	2	8
			45/20 adjuvant vaccine (reduced virulence non-agglutinogenic strain)		
10^{-7}	10	1·4	3*	0	10
10^{-8}	10	1·1	3*	0	10
			544 adjuvant vaccine (virulent agglutinogenic strain)		
10^{-7}	10	1·7	936	4	6
10^{-8}	10	1·7	196	3	7
			544 in saline (killed) vaccine (virulent agglutinogenic strain)		
10^{-7}	10	2·3	1,318	10	0
10^{-8}	10	1·8	337	9	1
			Controls		
10^{-7}	10	3·6	1,220	10	0
10^{-8}	10	3·5	792	10	0

The infective dose was inoculated eight weeks after vaccination.

The guinea-pigs inoculated with 10^{-7} dilution of live virulent culture were killed eight weeks later. Those inoculated with dilution 10^{-8} were killed nine weeks later.

* Three of 10 sera reacted at a titre of 1 : 10, seven sera were negative.

The resistance to infection of the guinea-pigs given the adjuvant vaccines is demonstrated by the results of the cultural examination of the spleens and the spleen weights shown in Table II.

All the animals given the vaccine prepared from the non-agglutinogenic strain of low virulence (45/20) resisted infection, and in so far as the stimulation of protective antibody is concerned this was the best vaccine.

There was no significant difference in the degree of protection conferred by the adjuvant vaccine made from the least virulent and the most virulent strains (45 and 544).

The sera collected at slaughter were tested at doubling dilutions from 1 : 10 to 1 : 5,120. Previous observations had shown that an adjuvant vaccine stimulated higher and more persistent agglutination titres than did a killed vaccine in saline. It is probable that had the sera of the guinea-pigs injected with the adjuvant vaccines 45 and 544 been tested before the inoculation of the challenge dose of live bacteria they would have reacted at moderately high titres. Nevertheless, the titres of the guinea-pigs given these vaccines were lower than those of the controls and of the animals injected with the killed vaccine in saline, corroboratory evidence of protection conferred by those two adjuvant vaccines.

In order to ascertain what the effect of injection of adjuvant vaccine 45/20 had on agglutinin production, six guinea-pigs received injections of this vaccine on the same day as the animals referred to in Table II were vaccinated. The six guinea-pigs were bled seven weeks later. The sera of two had a titre of 1 : 10, the other sera were negative. It is therefore possible that some agglutinogenesis may be stimulated by the use of an adjuvant with Strain 45/20. Whether the low titre shown by three guinea-pigs in each of the groups given adjuvant vaccines 45/20 shown in Table II were caused by vaccination or by the challenge inoculation of live culture is a matter of conjecture, but irrespective of the cause the absence of agglutinins or their presence at a titre of 1 : 10 only, reflects the very satisfactory immunity or resistance of the animals.

Discussion

The experiments recorded in the paper show that an antigen or antigens that stimulate a resistance to infection is or are heat stable ; that antigenicity is enhanced by the emulsification of the bacteria in oil ; and that antigenicity is not necessarily related or linked to the virulence or pathogenicity of the organisms when alive.

The highest protection was conferred by the adjuvant vaccine made with Strain 45/20 which is a " rough " non-agglutinogenic variant of low virulence obtained by repeated guinea-pig passage of Strain 45. In this variant the heat stable antigenic components responsible for the stimulation of protective immunity appear to be more available than in either the original parent strain or in the virulent field Strain 544.

Summary

1. A heat-killed adjuvant vaccine confers as high a resistance to infection as a living non-virulent vaccine.

2. The antigen or antigens responsible for the stimulation of a protective immunity are heat stable.

3. The protective properties of an adjuvant vaccine are not related to the virulence of the strain from which the vaccine is made. Non-virulent strains produce as satisfactory a vaccine as virulent.

4. A " rough " non-agglutinogenic strain of low virulence (Strain 45/20) provided an adjuvant vaccine of higher protective property than did a " smooth " non-virulent or a " smooth " virulent strain.

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Rupture of the Gastrocnemius Tendon in the Fowl

BY

F. T. W. JORDAN

Department of Veterinary Preventive Medicine, University of Liverpool

THE earliest published reference to this condition appears to be that of Bullis & Van Roekel (1944), who observed a 10 per cent. incidence in out-of-season hatched birds of five to seven months of age. Harris (1947), working at the Rowett Research Institute, encountered the condition in 1939 in 38 birds of a flock of just over 1,000 White Leghorn pullets.

Chute (1950) reported the disease in Canada in birds four to five and a half months old and cited a typical occurrence in a flock of 600 capons, 10 per cent. of which were affected. None of these workers was able to establish the aetiology of the condition.

The following is a description of the condition as seen in genetically related poultry stock on three separate farms.

Farm 1

This was also a hatchery and distributed its stock widely.

A large number of Light Sussex chicks were hatched in December, 1952. Most of them were sold as day-old chicks but a number of pullets were retained and reared, first in electric brooders and then in slatted floor arks on free range. There were very few rearing losses and at 20 weeks of age the total flock of 365 pullets was examined and divided into two groups. The 261 best grown birds, some of which were already in lay, were transferred directly to a strawyard ; the remainder (104) were managed semi-intensively in flocks of 35, 35 and 34 birds for six weeks and then put into the same strawyard.

Within 48 hours of transference to the strawyard two of the 261 pullets showed symptoms of ruptured gastrocnemius tendons and during the subsequent 10 weeks a further 20 were affected. In contrast no single instance of ruptured tendon occurred among the 104 more backward pullets which were kept semi-intensively for six weeks before transfer to the strawyard. The whole flock was kept under continuous observation for 20 months but no further cases appeared.

Some of the December-hatched Light Sussex birds which were sold from Farm 1 as day-old chicks to various farms also went lame. Five of them, three pullets and two cockerels from three separate farms, were returned because of rupture of the tendons occurring when the birds were 20 to 25 weeks old.

The main symptom in affected birds was lameness affecting one or both legs. In the 27 cases observed 14 birds were affected in only one and 13 in both legs. The degree of lameness varied from a severe type in which the bird was unable to bear any weight on the foot of the affected leg and walked on its hock (Fig. 1), to a comparatively mild type with slight lameness due to hock weakness (Fig. 2). In both types there was

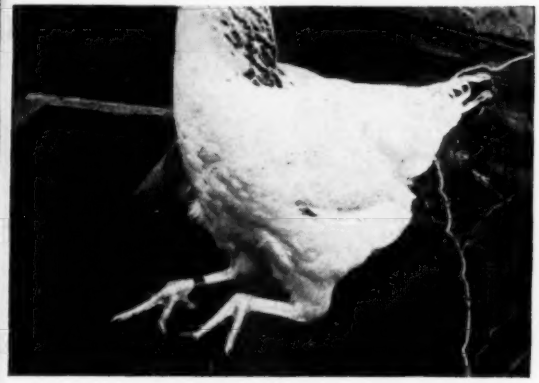

FIG. 1.—Light Sussex pullet—reared on farm 1—showing the effect of rupture of tendons of both legs.

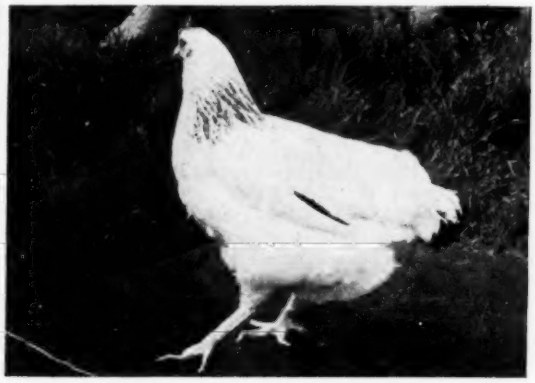

FIG. 2.—Light Sussex pullet, reared on farm 1, showing the effect of tendon rupture in one leg (left).

flexion of the phalanges of the affected leg but the alighting reflex was present. Birds which were only slightly affected were able to walk about freely but severely affected birds, especially those with bilateral damage, shuffled along on their hocks.

The site of rupture was shown by a greenish-blue discoloration of the skin about 1 inch above the hock and there was often some swelling and a nodular thickening of the tendon at this site.

All the affected birds were in good condition, showed no inappetence or depression, and some of them continued to lay. The cocks showed undiminished sexual desire.

Fifteen of the 22 affected pullets from Farm 1, and the two affected cocks which had been returned to Farm 1, were kept in a large poultry house with access to free range and were observed for at least six months. Two birds which were initially lame on only one leg broke down on the other 24 to 48 hours later. During the period of observation all 17 birds showed some clinical improvement (Table I). This was only slight

TABLE I

DEGREE OF RECOVERY IN 17 AFFECTED BIRDS OBSERVED OVER A PERIOD OF SIX MONTHS

Total number	Legs affected and sex		Recovery		
			Slight	Marked	Complete
17	Bilateral 9	8♀	5	1	2
		1♂	1	0	0
	Unilateral 8	7♀	1	0	6
		1♂	0	0	1

in six of the nine birds affected bilaterally, but seven of the eight birds affected in only one leg became sound within three months. One male bird became sound within one month and the other improved sufficiently to tread the hens and give rise to fertile eggs.

Although the period of observation included the autumn and early winter months the average egg yield for the 15 birds was 50 per cent.

All 17 birds eventually came for autopsy and lesions in the tendons were confirmed in all of them.

Farm 2

The condition was seen in Light Sussex and in Brown Leghorn × Light Sussex stock.

(*a*) *Light Sussex Stock*

In 1952, 16 yearling hens and a cock were purchased from Farm 1, and hatching from their eggs took place between December, 1952, and March, 1953. Some of the progeny were sold but 140 pullets were retained and kept semi-intensively. Ten of them (8 per cent.) developed typical symptoms of ruptured gastrocnemius tendon when at the point of lay (21 to 26 weeks old).

The nature of the lesion was confirmed in the three affected birds sent for autopsy.

In 1954, 15 of the 16 original Light Sussex hens were mated to another Light Sussex cock purchased from Farm 1. One hundred and fifty pullet progeny were reared on the premises and under similar conditions to the previous year's hatch. Six (4 per cent.) showed typical symptoms of ruptured tendons and the condition was confirmed in the three of them which came for autopsy.

(*b*) *Brown Leghorn × Light Sussex Stock*

During the same year 80 Light Sussex pullets retained from the original 140 hatched in 1952–1953 were mated with Brown Leghorn males which had been bred and reared on the farm and were not related to any birds on Farm 1. Of a total of 340 Brown Leghorn × Light Sussex progeny of this mating 18 showed symptoms of ruptured tendons and the condition was confirmed in the four that came for autopsy.

The 340 offspring can be considered in two groups :—

(*a*) 120 December–January hatched pullets ;
(*b*) 220 January–February hatched pullets.

The two groups were put in adjacent strawyards on the same day in June, the older group (*a*) being six months old and the younger group (*b*) four to five

months old. Eighteen cases (8·2 per cent.) of ruptured gastrocnemius tendon occurred among the 220 birds in the younger group (*b*) within eight weeks of transfer to the strawyard, while not one case occurred in the older group of birds although both flocks were under observation in the strawyards for six months.

Farm 3

Commercial poultry keeping for egg production was practised on this farm. In December, 1953, the farmer purchased 600 day-old Brown Leghorn × Light Sussex pullets from Farm 1. The birds were reared first on free-range and then from 20 weeks of age on built-up litter. Typical symptoms of ruptured gastrocnemius tendon were observed in 18 birds (3 per cent.) between 20 and 26 weeks of age and the condition was confirmed in the three birds sent for autopsy. Further observations on the flock were not possible because an outbreak of Newcastle disease caused the destruction of the whole of the poultry stock.

The Appearance of the Lesions

In every case examined the lesion involved the medial head of the gastrocnemius, either at its junction with the lateral head or more proximally within the muscle itself.

Recent lesions consisted of swelling, oedema, haemorrhage, and partial or complete rupture of the tendon (Fig. 3). The hock joint and the sciatic nerves were macroscopically normal. Long-standing lesions showed a nodular thickening composed of dense fibrous tissue.

Histologically there was haemorrhage and fibroblast proliferation, together with the formation of metaplastic cartilage and some mineralisation.

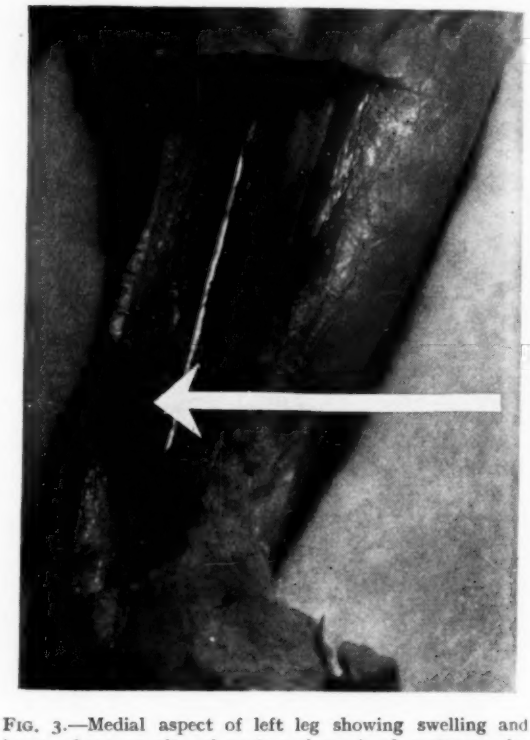

FIG. 3.—Medial aspect of left leg showing swelling and haemorrhage at site of rupture (arrow) of gastrocnemius tendon, about 1 inch above the hock.

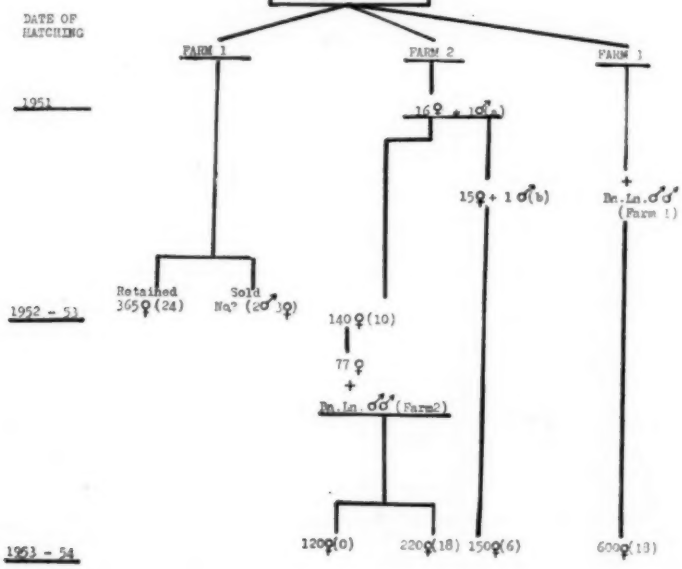

FIG. 4.—The relationship of the affected birds.

Discussion

The aetiology of this condition is obscure. Chute (1952), who considered the current theories on aetiology under the three headings—predation, nutrition and management, and genetic factors—did not attach particular importance to any one of these.

In our cases there was no evidence that injury by predatory animals was a factor.

Out-of-season hatching may be of some significance since on all three farms most of the birds which were affected were hatched in the winter months.

Management and feeding varied on the three farms but nearly all the cases of ruptured tendon occurred in birds kept in strawyards or deep litter. It is possible that these two systems of management, in which birds spend much of their time scratching in litter, might favour rupture of the gastrocnemius tendon in birds with an inherited tendon weakness.

The disease has been recorded in a variety of breeds and strains but in our cases all the affected flocks were either pure-bred Light Sussex or cross-breeds of Light Sussex. Furthermore, all the Light Sussex stock were derived from Farm 1 (Fig. 4). It would thus appear probable that a genetic factor is concerned. This is supported by the fact that on Farms 1 and 2 Brown Leghorn and Rhode Island Red birds and their crosses other than Light Sussex showed no evidence of ruptured tendons when reared under the same conditions.

Summary

Rupture of the gastrocnemius tendon affecting one or both legs occurred in 24 (9·2 per cent.) of a group of 261 Light Sussex birds, five to six months old, which had been selected for early maturity. A total of 57 cases was seen on two other farms among pure-bred or cross-bred Light Sussex birds which were related to the Light Sussex stock on Farm 1.

These observations suggest that an inherited predisposition, together with early maturity and the use of strawyard or deep-litter systems of management, may be the aetiological factors concerned.

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RESEARCH ON RABIES

Six of the world's leading authorities on virus diseases are attending a course on rabies at the East African veterinary research laboratories at Muguga, near Nairobi. Welcoming the delegates, the administrator of the East Africa High Commission, Mr. A. M. Bruce Hutt, said he was confident that the results of the deliberations would extend far beyond Africa.

The director of the course is Dr. Martin Kaplan, veterinary public health officer of the World Health Organisation at Geneva.

Treatment of Anoestrus in the Maiden Bitch

BY

A. W. VAUGHAN

Government Veterinary Officer, St. Kitts, Leeward Islands, B.W.I.

Introduction

NORMAL oestrus in the bitch is completed twice a year, and is divided into four phases, namely, pro-oestrus, oestrus, metoestrus and anoestrus. The anoestrus phase extends from metoestrus until the beginning of the next pro-oestrus, and is of two to three months' duration. The most common cause of functional sterility in the bitch is the anoestrus phase persisting for an abnormally prolonged anoestrus. This can occur in the parous bitch following a normal cycle, or less commonly in the maiden bitch which has never displayed signs of " heat."

The maiden bitch with persistent anoestrus or delayed oestrus is a problem to the breeding fraternity, and advice is commonly sought with this type of infertility. The results of treatment in such cases are often disappointing. It is likely that many such cases are due to internal genital hypoplasia, which in turn is due to deficient or absent secretion of oestrogens—ovarian insufficiency. It is extremely difficult, if not impossible, sharply to define the different endocrine disturbances affecting the ovaries, inasmuch as hypofunction or hyperfunction of one or more hormones may co-exist. For this reason the results of treatment with oestrogens are variable. This is particularly so in the maiden animal, and for this reason the following case is recorded.

Subject

Pedigree white Alsatian bitch imported from England in 1952 (three years old at time of writing).

History

At 18 months this animal had not showed any signs of " heat." The physical condition was good, and there was no evidence of deficient thyroid function (obesity, alopecia, etc.). The animal had been checked on numerous occasions since puppyhood for internal parasites, and treatment given when indicated. Diet and vitamin requirements had been rigidly adhered to. Apart from the complete absence of " heat," the only abnormality seen on physical examination was labial hypoplasia—the vulva having the characteristics of pubescence.

Treatment

Stilboestrol dipropionate in oil was given in graduated doses by intramuscular injection at three-day intervals as follows : 0·1, 0·2, 0·5 and 1·5 mg. The result was singularly unsuccessful, and after an interval of some weeks a single dose of 300 I.U. of P.M.S. was administered by intramuscular injection. No response was observed.

Later in the year it was decided to attempt oestrone therapy. Oestradiol monobenzoate was used intramuscularly at the dosage of 2,000 I.B.U. bi-weekly, followed by 4,000 I.B.U. bi-weekly. Approximately four days after the last injection had been given there was slight vulvar bleeding. The labial hypoplasia

Current Literature

ABSTRACT

Artificial Insemination of a Bitch with Preserved Semen. HARROP, A. E. (1954). *Brit. Vet. J.* **110.** 424–425.

Two pups have been born to a greyhound bitch inseminated on the 12th day of oestrus with semen diluted in pasteurised milk and stored for 100 hours. Previous obstacles to dog breeding, such as physical inability to mate, the restricted use of one dog at natural service, and not least transport and quarantine difficulties when dog and bitch are widely separated, may now be overcome.

Semen is collected fractionally in a canine artificial vagina and the second (sperm containing) fraction examined microscopically for quality. Pasteurised milk is gradually re-heated to 92° to 94° C., maintained there for 10 minutes, and allowed to cool. The "skin" is discarded and the semen diluted with seven parts of milk and stored at 4° C.

For insemination, an all-glass syringe with rubber tubing adaptation to a 1-ml. glass pipette is used with a speculum made from a 6- by $\frac{5}{8}$-in. test tube with a hole blown in the bottom. After cleansing the external genitalia the lightly lubricated speculum is inserted into the vagina and the cervix identified with a torch. The pipette is passed through the external os, the charged syringe connected and 4 c.c. diluted semen placed in the uterus. This obviates the need to raise the hindquarters. J. S.

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remained almost unaltered, and little interest was evinced by the dog. The bitch did not come into true oestrus, and bleeding stopped after two days—pro-oestrus only had been induced.

Anoestrus persisted for a further seven months, and as the animal was now nearly three years of age, a final attempt to induce oestrus was made, using combined oestrone and chorionic gonadotropin therapy. P.M.S. 200 I.U. and luteinising hormone 50 I.U. were simultaneously administered by subcutaneous injection. Within four days there was copious vulvar bleeding, followed by progressive enlargement of the labiae. Several vaginal smears were made, and on the seventh day the smear showed absence of leucocytes, epithelial cells very darkly stained, and a few erythrocytes. Oestrus was confirmed the following day by acceptance, and the bitch was served. The resulting pregnancy was followed by uneventful whelping on the 64th day, when four normal puppies were born.

Summary

The results of several lines of treatment used in an attempt to correct anoestrus in the maiden bitch are recorded. The use of combined oestrone and chorionic gonadotropin therapy was successful, and normal pregnancy and whelping resulted.

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DIGEST

Leptospirosis in cattle

Leptospirosis in cattle was first recorded in the U.S.A. in 1944, since when it has been shown to exist in 28 states. The chief symptoms are described by Dykstra (1954), as fever, jaundice, haemoglobinuria, diarrhoea, agalactia, and abortion. In practice, however, the haemoglobinuria and jaundice are uncommon, and the general clinical picture is confused and difficult to identify without a blood test. The causal organism is the spirochaete, *Leptospira pomona*, which is excreted in the urine and faeces of infected animals.

Podgwaite and his co-workers (1955) decided to examine for leptospirosis all aborted foetuses sent to them for routine diagnosis and successfully isolated leptospira from three out of the next 13 abortions. Examination of the blood of the dams concerned showed a positive titre (agglutination lysis test) in only one case. This animal was immediately slaughtered and cultures of *L. pomona* were made from the liver and kidney, in which organs the leptospira are most readily demonstrated. The remaining two animals were kept under observation with the interesting result that both developed positive blood tests one and four months after the abortion, although they were negative at the time of their abnormal parturition. The significance of this finding was not discussed; nevertheless, the incidence of bovine leptospirosis, revealed by this survey, was considered by the authors to justify an immediate report, in which they described their methods in detail, probably to encourage the commencement of more surveys.

No details of the histories of these cases of abortion are given, except to indicate that the abortion may take place at any stage during the period of gestation. Other workers have noted, however, that such foetuses were oedematous, with an excess of fluid in the thoracic, peritoneal, and pericardial cavities.

Ringen *et al.* (1955) investigated the treatments for bovine leptospirosis, and observed that a number of antibiotics relieved the symptoms, but only dihydrostreptomycin was effective in eliminating the parasite. For this purpose an intramuscular injection of 5 mg. dihydrostreptomycin per pound bodyweight every 12 hours for three days was necessary.

The preparation and evaluation of a vaccine for prevention of bovine leptospirosis is described by Brown *et al.* Doses of 5 c.c. of this vaccine injected subcutaneously enabled calves to withstand inoculation with *L. pomona* for six months without ill effect. The results of serological studies of the vaccinated animals encouraged the authors to predict that the immunity might last for 12 months, although this protection was not challenged again after the six months.

D. W. J.

References

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B.V.A. CONGRESS

September 4th to 10th, 1955

AT QUEEN'S UNIVERSITY, BELFAST

Programme

(Meetings will be held in a number of different halls and rooms as indicated)

SUNDAY, SEPTEMBER 4th

8.00 to 10.30 p.m.
At Home, given by the North of Ireland Division at the Grand Central Hotel, Royal Avenue, Belfast.

MONDAY, SEPTEMBER 5th

10.00 a.m.—In the Sir William Whitla Hall, Queen's University.
Welcome by the Lord Mayor of Belfast (Alderman R. J. R. Harcourt, J.P.) and by Professor F. H. Newark, B.C.L., M.A. (Pro-Vice-Chancellor, Queen's University).
Official Opening of the Congress by the Minister of Agriculture for Northern Ireland (The Rt. Hon. The Rev. R. Moore, M.P.).

10.30 a.m.—In the Great Hall, Queen's University.
Opening of Congress Exhibition by the President, B.V.A. (Professor A. Robertson, M.A., B.SC., PH.D., M.R.C.V.S., F.R.S.E., F.R.I.C.).

11.30 a.m. to 12.30 p.m. In the Zoology Lecture Room.
Films.

2.30 p.m.—In the Sir William Whitla Hall.
Paper : "Brucellosis Control and Eradication"—in Denmark, by Director Woldike Nielsen; in Canada, by Dr. C. Mitchell; in U.S.A., by Dr. C. K. Mingle.
Opener : J. N. Ritchie, C.B., B.SC., M.R.C.V.S., D.V.S.M.
Chairman : E. Wilkinson, M.R.C.V.S.
Recording Secretary : R. W. Cassells, M.R.C.V.S.

3.00 to 4.00 p.m.—In the Zoology Lecture Room.
Films.

8.30 p.m. to 12 Midnight.—In the City Hall.
Civic Reception and Dance, by kind invitation of the Lord Mayor and Corporation of Belfast.

TUESDAY, SEPTEMBER 6th

9.30 a.m.—In the History Lecture Room.
Paper : "The Veterinary Surgeon and the New-born Foal," by J. S. M. Cosgrove, M.R.C.V.S.
Opener : Sean M. Collins, M.R.C.V.S.
Chairman : R. Moore, M.R.C.V.S., D.V.S.M.
Recording Secretary : H. N. Ferguson, M.R.C.V.S.

9.30 a.m.—In the Physics Lecture Theatre.
Symposium of Short Papers : "Vital Statistics in Veterinary Medicine." "Survey of Diseases of Dairy Cattle," by F. W. Withers, M.A., PH.D., M.R.C.V.S.; "A Statistical Survey of Veterinary Practice," by C. S. Grunsell, PH.D., M.R.C.V.S., and H. Paver, PH.D., B.SC.; "Survey of Sheep Diseases," by G. B. S. Heath, B.SC., F.R.C.V.S.; "Survey of Pig Losses," by J. F. Gracey, M.R.C.V.S., D.V.S.M.
Opener : A. W. Stableforth, D.SC., M.R.C.V.S., D.V.S.M.
Chairman : S. R. Bolton, M.R.C.V.S.
Recording Secretary : J. R. Stratford, M.B.E., M.R.C.V.S.

10.30 a.m.—In the Senate Room.
Last Meeting of Council, 1954–55.

11.00 a.m.—In the Grounds of Queen's University.
Congress Photograph.

11.30 a.m.—In the Physics Lecture Theatre.
Annual General Meeting.

3.00 to 4.45 p.m.—At Parliament Buildings, Stormont.
Government Reception.

6.00 for 6.30 p.m.—Veterinary College Dinners.

8.30 p.m. to 1.00 a.m.—In the Sir William Whitla Hall.
Ladies' Guild Dance.

WEDNESDAY, SEPTEMBER 7th

9.00 a.m.—Leaving from Queen's University.
Main Excursion to The Giant's Causeway, via the Antrim Coast Road and the Glens of Antrim (lunch and tea *en route*).

9.30 a.m.—In the History Lecture Room.
Paper : "Impact of Environment on the Health and Productivity of Pigs," by W. A. M. Gordon, M.R.C.V.S., and D. Luke, PH.D., B.SC., M.R.C.V.S.
Opener : D. W. B. Sainsbury, PH.D., B..SC., M.R.C.V.S.
Chairman : P. L. Shanks, B.SC., M.R.C.V.S.
Recording Secretary : T. H. J. Steele, M.R.C.V.S.

11.30 a.m.—Leaving from Queen's University.
Visit to McGuckian's pig farm (lunch *en route*).

11.30 a.m.—Leaving from Queen's University.
Shorter Excursion along Antrim Coast Road, to Carnlough, via the Coast Road (lunch and tea *en route*).

11.30 a.m. to 12.30 p.m.—In the Zoology Lecture Room.
Films

7.00 for 7.30 p.m.—In the Sir William Whitla Hall.
Annual Banquet.

THURSDAY, SEPTEMBER 8th

9.30 a.m.—In the Physics Lecture Theatre.
Paper : "The Effects of Atomic Explosions upon Animals," by Dr. J. F. Loutit (Atomic Experimental Research Establishment, Harwell) and Dr. Scott Russell (Dept. of Agriculture, Oxford University).
Opener : Major J. H. Wilkins, B.SC., M.R.C.V.S.
Chairman : W. R. Kerr, PH.D., B.SC., M.R.C.V.S., D.V.S.M.
Recording Secretary : R. A. Gilmore, B.A., M.R.C.V.S.

11.00 a.m.—In the History Lecture Room.
Paper : "Recent Advances in Parasiticides," by H. E. Harbour, B.A., M.R.C.V.S.
Opener : R. B. Griffiths, B.V.SC., M.R.C.V.S.
Chairman : T. McNabb, PH.D., B.SC., F.R.C.V.S.
Recording Secretary : J. T. Baxter, M.R.C.V.S.

11.00 a.m.—In the Zoology Lecture Theatre.

Paper : "Safe Anaesthesia," by L. W. Hall, M.A., B.SC., M.R.C.V.S.

Opener : J. S. A. Spreull, PH.D., M.R.C.V.S.
Chairman : D. Laird, M.R.C.V.S.
Recording Secretary : T. H. Allen, M.R.C.V.S.

11.00 a.m.—In the Senate Room.

Ladies' Guild Annual General Meeting.

Afternoon.

Golf, tennis, etc.

1.45 p.m.—Leaving from Queen's University.

Excursion to Mountains of Mourne (tea at Newcastle).

3.00 to 4.00 p.m.—In the Zoology Lecture Room.

Films

7.30 for 8.00 p.m. to 12 Midnight.—In the Orpheus Ballroom, Belfast Co-operative Society Buildings, York Street, Belfast.

"Ulster Night."

FRIDAY, SEPTEMBER 9th

9.30 a.m.—In the Physics Lecture Theatre.

Paper : "Adverse Effects on Animal Health brought about by Man's Interference with Nature," by E. L. Taylor, C.B.E., D.V.SC., M.R.C.V.S., D.V.H., N.D.A., N.D.D.

Openers : G. N. Gould, M.R.C.V.S., J.P., and Professor R. G. Baskett, O.B.E., M.SC., A.R.I.C.
Chairman : Professor H. G. Lamont, O.B.E., D.SC., M.R.C.V.S.
Recording Secretary : D. R. Marshall, M.R.C.V.S.

11.00 a.m.—In the History Lecture Room.

Paper : "Recent Advances in our Knowledge of the Physiology of Ruminant Digestion," by A. T. Phillipson, M.A., PH.D., M.R.C.V.S., F.R.S.E.

Opener : F. Alexander, PH.D., D.SC., M.R.C.V.S.
Chairman : F. S. Hart, M.R.C.V.S.
Recording Secretary : J. A. Adams, M.R.C.V.S.

12.00 a.m.—In the Zoology Lecture Theatre.

Paper : "Transport of Animals and Problems Arising" : Air Transport, by Major R. C. G. Hancock, B.SC., M.R.C.V.S., ; Rail, Road and Sea, by James Reid, M.R.C.V.S., D.V.S.M.

Opener : J. O. L. King, M.V.SC., B.SC., M.R.C.V.S.
Chairman : H. L. McConnell, M.R.C.V.S.
Recording Secretary : R. McCrea, M.B.E., M.R.C.V.S.

2.30 p.m.—In the Physics Lecture Theatre.

Paper : "Hormone Control of the Oestrous Cycle," by Professor E. C. Amoroso, PH.D., B.SC., M.B., B.CH., B.A.O.

Opener : Mrs. M. Sheppard, M.R.C.V.S.
Chairman : E. Conn, M.R.C.V.S.
Recording Secretary : P. S. McBride, M.R.C.V.S.

2.30 p.m.—In the History Lecture Room.

Paper : "Recent Advances in Poultry Therapeutics," by W. P. Blount, PH.D., F.R.C.V.S., F.R.S.E.

Opener :
Chairman : D. Luke, B.SC., PH.D., M.R.C.V.S.
Recording Secretary : W. D. J. McCartney, B.SC., M.R.C.V.S.

3.00 to 4.00 p.m.—In the Zoology Lecture Room.

Films.

7.30 for 8.00 p.m. to 1 a.m.—In the Sir William Whitla Hall, Queen's University, Belfast.

President's Reception and Dance.

SATURDAY, SEPTEMBER 10th

10.00 a.m.—In the Sir William Whitla Hall.

Closing Meeting of Congress.

Followed by

First Meeting of Council for 1955–56.

Lunches will be provided every day from 12.30 to 2.00 p.m. in the Student's Union, Queen's University.

Morning Coffee (11 a.m.) and Afternoon Tea (4 p.m.) will be provided each day in the Exhibition Hall.

University News

Edinburgh

The following degrees were conferred at a Graduation Ceremonial on July 7th:—

B.Sc. in Veterinary Science:—

Ashton, Peter Kenneth, M.R.C.V.S.; Barnes, Pamela Cole, M.R.C.V.S.; Barr, Thomas Robert Bonner, B.SC.(AGR), M.R.C.V.S.; Christie, Ronald Forbes, M.R.C.V.S.; Couttie, Peter, M.R.C.V.S.; Edwards, Margaret Elaine, M.R.C.V.S.; Findlay, Charles Richardson, M.R.C.V.S.; Garden, Sigurd, M.R.C.V.S.; Haith, Colin Frank, M.R.C.V.S.; Irving, Patricia May, M.R.C.V.S.; Jones, David Fenwick, M.R.C.V.S.; Manktelow, David Brian Saxby, M.R.C.V.S.; Mitcheson, Joseph Albert Johnson, M.R.C.V.S.; Parminter, Donald, M.R.C.V.S.; Paterson, Robert Campbell Gilmour, M.R.C.V.S.; Pill, Alan Hugh, M.R.C.V.S.; Poole, Anthony, M.R.C.V.S.; Raditapole, Norman Napo, M.R.C.V.S.; Spence, John Brian, M.R.C.V.S.; Watt, Ian Milne, M.R.C.V.S.; Wittrick, David Antony, M.R.C.V.S.

Glasgow

The following passes are announced in the final B.V.M.S. Examination:—

Kenneth W. Angus, George L. Barr (Distinction Medicine), John D. Barr, Catherine Earl, John M. Hamilton, Allan R. Hunter, James Love, Donald W. G. Macaskill, Richard R. MacKay, Ian C. Marr, Scott C. Moffat, Robert H. Morton, Rodney J. Noble, John Y. Pollock (Distinction Medicine and Surgery), Ernest Thorpe, Gillian O. Wickens.

The graduation was held on Saturday, July 9th, and the graduates were received into the Royal College by Professor Weipers at a short ceremony, held after the graduation, in the Randolph Hall of the University.

Nottingham

At a Congregation of the University of Nottingham for the conferment of degrees, held on June 30th, Mr. I. B. Munro, M.R.C.V.S., was admitted to the Degree of Master of Science in the Faculty of Agriculture.

News and Comment

SIR WINSTON CHURCHILL AS PIG FARMER

Dr. W. M. McKay and Professor Hjalmer Clausen were invited to meet Sir Winston Churchill at Chartwell during Professor Clausen's recent visit to this country, to discuss the development of Sir Winston's herd of Swedish Landrace pigs.

Professor Clausen and Dr. McKay were received by Sir Winston last Sunday for almost an hour in his study at Chartwell after they had spent the afternoon visiting the farm and inspecting the herd of pigs with Sir Winston's agent, Mr. P. W. Cox, O.B.E.

Sir Winston, who had entertained Mr. Averill Harriman to lunch, was in a jovial mood and had many pithy remarks to make and showed a keen appreciation of the economics of the introduction of the Landrace into this country. The matter was discussed over some of the famous Churchillian cigars.

Before leaving, Professor Clausen and Dr. McKay were shown a filly foal by Hyperion, which Chartwell people hope will bring laurels to the name in a future Oaks.

THE REGISTER OF VETERINARY SURGEONS

The name of Mr. William Charles Love Orr, of 17 Prince Albert Road, Regent's Park, London, N.W.1, has been restored to the Register of Veterinary Surgeons. So also has that of Mr. Alfred Ratcliffe Lyons, of 36 Lord Lytton Avenue, Coventry.

TRANSFER OF FUNCTIONS (FOOD AND DRUGS) ORDER, 1955

The Transfer of Functions (Food and Drugs) Order, 1955, providing for the transfer of certain food hygiene functions from the Minister of Agriculture, Fisheries and Food to the Minister of Health, was laid before Parliament on July 5th. Under this Order the Ministry of Health became the central department responsible in England and Wales for general food hygiene work with effect from July 6th. The Ministry of Agriculture, Fisheries and Food, however, remain the central department responsible for the hygiene of milk production and distribution, and of meat and meat products while in a slaughterhouse or in the course of importation, as well as for the composition and labelling of food. The Ministry of Health will still be the central department responsible for medical advice on all food matters and for measures for the control of milk-borne disease.

THE WELLCOME TRUST

Dr. F. H. K. Green, C.B.E., F.R.C.P., Principal Medical Officer on the headquarters staff of the Medical Research Council since 1949, has been appointed Scientific Secretary to the Trustees of the Will of the late Sir Henry Wellcome (The Wellcome Trust, 24 Harley Street, London, W.1.), with effect from October 1st, 1955. He will accordingly leave the service of the Medical Research Council on September 30th.

HUMANE TRAPS ADVISORY COMMITTEE

In a Parliamentary reply the Minister of Agriculture, Fisheries and Food, the Rt. Hon. D. Heathcoat Amory, M.P., has announced that the Humane Traps Advisory Committee has made its first report. Since the first meeting in July, 1954, the Committee have examined prototypes or designs of 102 traps, of which 17 have been selected for field trials. One or two traps show promise of replacing the gin, but much further work remains to be done and the Committee are unable to recommend any advance in the date, *i.e.*, July 31st, 1958, appointed by Section 8 of the Pests Act, 1954, for banning the gin. The Government has accepted this recommendation.

MINK

A census taken earlier this year by the Fur Breeders' Association of the United Kingdom showed that the total mink population of this country was, so far as their members were concerned, in the region of 12,700. Seventeen farms each have over 150 mink, but the total of 162 farms includes some 24 with only between one and 10 females. There appear to be extremely few silver foxes and martens, and only 99 chinchilla and 65 nutria.

HOLIDAY FOR STUDENTS

A letter has been received from the Editor of an important newspaper in Hanover offering hospitality to one or two young students, men or women, in his house during the summer. The family lives near the Eilenriede in Hanover, and most of the members of the family speak English. Except for the cost of travelling this hospitality is by invitation and there will be no charge for it. Will anyone who is interested please write direct to Frau Margarethe Woytzyk-Weil, Sallstrasse, 43, Hanover.

FRENCH HOLIDAY EXCHANGE

In case there are any other members of the Association still interested in sending their children to France for a holiday and having French children in return, the following particulars may be useful.

Sarthe Region: Boy, 18 years old, wishes to exchange with English boy or girl.

Gers Region: Boy, 12 years old.

Seine-et-Marne Region: Boy, 17 years old, wishes to stay *au pair* in England.

Maine-et-Loire Region: Girl, wishes to stay *au pair* in England for eight days.

Mayenne Region: Boy of 11 years: *or* boy of 9 years.

Yonne Region: Girl aged 17 years and girl aged 13 years (*au pair* or paying guests.)

Loiret Region: Boy, 11 years old.

R.C.V.S. JUNE/JULY, 1955 EXAMINATIONS

University of Glasgow Veterinary School

Fourth Examination.

Kozorowski, E. M. (By-law 95 candidate); Patel S. J. F. (By-law 95 candidate).

Final Examination.

Haresnape, I. C.; Hutchison, James.

University of Bristol Veterinary School

Fourth Examination.

Bailur, D. M. (By-law 95 candidate).

Edinburgh

Third Examination.

Gee, B. D.; Gray, Brian; Robertson, H. L.; Rodger, J. L.

Fourth Examination.

Bhasker, C. G.; Camden-Smith, M. J. (Paras); Cameron, D. C. K.; Clark, Miss N. D.; Coutts, Kenneth; Griffiths, P. H. M.; Hastie, Hamish; Imlah, Peter; Ironside, J. B. R.; Jones, J. H.; Lamont, P. H. (Paras); Lawrence, J. A.*; Macdonald, D. C. (Paras); McFerran, J. B.; McHugh, T. M.; Matthews, R. G.; Miller, J. K.; Mohy-Uddin, G.; Morrish, J. S. H.; Penman, Gordon; Pratt, D. A.; Richards, B. G.; Rowland, A. C.; Rowland, James; Sedgwick, J. R. W.; Stephens, M. B.; Thomas, M. E. R.; Todd, R. H.; Tordoff, D. B. (Paras); Wastie, Miss P. C.; Weaver, A. D.; Whitmore, M. M.; Wilson, G. A.

*Denotes 2nd class Honours. (Paras) denotes credit in Parasitology.

Final Examination.

Ashton, P. K. (M); Baird, J. S.; Barnes, Miss P. C.; Barr, T. R. B.; Borthwick, Ramsay; Catticart, R. A. (M); Christie, R. F.; Couttie, P.; Curran, G. D.; Dickson, James; Edwards, Miss M. E. (M); Findlay, C. R.; Forsyth, D. W.; Garden, Sigurd; Gaunt, J. L.; Grant, Forbes; Haith, C. F.; Irving, Miss P. M.; Jones, D. F.; Levack, Miss M. E. S.; Manketelow, D. B. S.; Mitcheson, J. A. J.; Muirhead, R. H.; Parminter, Donald (M); Paterson, R. C. G.; Pill, A. H.; Podd, G. H. (M); Poole, Anthony (M); Raditapole, N. N.; Rodger, D. S.; Shields, W. G.; Spence, J. B.; Steele, R. B. T.; Sutherland, I. H. (M); Taylor, J. C.; Teale, P. C.; Tennant, L. D.; Watt, I. M.; Wittrick, D. A.

(M) denotes credit in Medicine.

Dublin

SECOND EXAMINATION.

Physiology and Anatomy.

Cousins, F.; Duffy, E. F.; Gaffney, W. M. N. (P); Gormley, B. A.; Harringston, D. P.; Kenny, M. P.; Murray-Hayden, P. J.; O'Leary, Michael; Prendergast, M.

(P) denotes credit in Physiology.

Physiology only.

Carroll, D. (credit); Downey, J. S. (credit); Doyle, I. M.; Flanagan, J. P. (credit); King, M. B.; Lawlor, F.; Lowndes, D.; Lydon, C.; Monaghan, M. B. G.; O'Donnell, L. I.; O'Neill, A.; O'Neill, C.; O'Reilly, D. J.; Reidy, D. F.; Sheahan, T. J.; Smith F. M.

Anatomy only.

Barrett, J. N.; Berry, J. P.; Boyce, M. W. F.; Collins, T. D.; Corry, D. M. G.; Crawford, H.; Delahunty, D.; Dickson, H. P.; Dowling, W. A.; Duignan, J. J.; Flannery, D.; Hannigan, J. H.; Leslie, N. W.; McKervey, J. H.; McKinley, P. J.; McIver, S. H.; Maloney, R.; O'Brien, T. J.; Phelan, N. P.; Smyth, J. J.; Trouton, R. K.; Walsh, J.; Wilson, R. W.

THIRD EXAMINATION

Hygiene only

Byrne, C. J.; Cooney, J. F.; Crowe, J. F.; Denvir, K.; Doherty, P. L.; Dolan, T. C.; Gibney, E. E.; Hernon, J.; Jones, R. F.; Keane, M.; Kelleher, J. F.; Moloney, P.; Mansfield, M. P.; Martin, W. H.; May, D. J. (credit); Mulvey, W. J.; McCarthy, W.; McDonald, W. E.; McGilligan, C. A.; McGovern, P. G.; McLaughlin, D.; Osborne, M.; Rispin, K.; Schlesinger, P.; Smyth, D. J.

Pathology only

Allen, R. S.; Barnes, T.; Cody, O. H.; Cotter, W.; Daly, D. J.; Daly, Edward; Deboys, D. C.; Ennis, Miss D.; Handcock, W. J.; Hurley, J. D.; Hurley, T. J.; Kent, D. K.; Lee, J. G.; Nolan, P. J. (credit); O'Connor, J. J.; Ryan, M. A.; Teevan, R. J. (credit); York, A. J.

Final Examination.

Ballesty, J J.; Barry, K. T.; Boyd, J. R.; Brownell, T. A.; Cawdery, M. J.; Crowley, J. P.; Fleury, A. T.; Gray, R. F.; Harris, Miss M. D.; Harris, R. E.; Hartigan, P. J.; Huey, J. A.; Mackissy, E. J.; Nunn, W. R.; O'Brien, J. P.; O'Donnell, O.; Poole, D. B.; Smith, K. J.; Stuart, N. C.; Tuite, M.

PERSONAL

Births

COLE-POWNEY.—On June 26th, to Kathleen Cole-Powney, M.R.C.V.S. (*née* Hernaman-Johnson) and Norman Cole-Powney, 61, Ruskin Road, Carshalton, Surrey, a daughter, Margaret Elizabeth.

GRAINGER.—On July 10th, 1955, to Dorothy, wife of K. J. Grainger, M.R.C.V.S., of West Felton, Oswestry, Salop, a son, Martin Roger.

NEWSAM.—On July 4th, 1955, at Cambridge, to Doreen E., wife of Ian D. B. Newsam, M.R.C.V.S., Browning House, Great Shelford, Cambridge, a daughter, Jill Suzanne.

Engagement

RICHARDS—PAIN.—The engagement is announced between Michael Anthony Richards, M.R.C.V.S., son of Mr. and Mrs. E. A. Richards, of West Horsley, Surrey, and Sylvia Rosemary Pain, daughter of Mr. J. C. Pain, J.P., of Pinglestone Farm, Old Alresford, Hants, and the late Mrs. Christobel Pain.

Marriage

SUTHERLAND-STAPLIN.—On July 9th, 1955, at Monks Eleigh, Suffolk, Bruce Sutherland to Jill Staplin.

COMING EVENTS

July

20TH (WED.). Annual General Meeting of the Southern Region of the A.V.T. & R.W.'s at the Agricultural Research Council Field Station, Compton, Berks.

22ND (FRI.). Meeting of the Yorkshire Division, B.V.A., at the Ministry of Agriculture, Government Buildings, Crosby Road, Northallerton, 2.30 p.m.

Summer Meeting of the Mid-West Division, B.V.A., at the Bristol University Veterinary School, Langford House, Langford, 2.30 p.m.

28TH (THURS.). President's Invitation Luncheon and General Meeting of the Midland Counties Division, B.V.A., at the Swan Hotel, Stafford, 12.30 p.m.

Special Meeting of the Technical Development Committee, B.V.A., at 7, Mansfield Street, London, W.1, 10.30 a.m.

September

4th to 10th. 73rd Annual General Meeting and Congress of the British Veterinary Association at Belfast.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Derby. Elm Tree Farm, Barlow, Sheffield (July 7).

Isle of Wight. Roud Farm, Roud (July 7).

Lincs. Southfield Farm, Horncastle (July 2).

Yorks. Apple Tree Farm, and Pen Bank Farm, Altofts, Normanton (July 1); Tollesby Farm, Marton, Middlesbrough (July 2).

Fowl Pest

Bedford. Keely Farm, Wootton (July 6).

Bucks. 5, Salisbury Place, Chalvey, Slough (July 7).

Essex. 22, Percy Road, Leystonstone, E.11 (July 7).

Hants. Rumsey Poultry Farm, Jubilee Road, Waterlooville, Portsmouth (July 4); Green Path, Andover; Littlecroft Lane, Gosport; Homefield Cottages, Hawkley, Liss (July 6).

Herts. 58, Pymmes Green Road, New Southgate, N.11 (July 4).

Kent. Ferndale, Stockbury, Sittingbourne; Rose Cottage, Wateringbury, Maidstone (July 5).

Leics. 153, Meadow Lane, Loughborough (July 7).

Lincs. Quebec Road, Mablethorpe (July 5).

London. 11, Cranbrook Terrace, Bethnal Green, E.2; 13, Bartley Road, Brixton Hill, S.W.2; 9, St. Margaret's Terrace, Plumpstead, S.E.18; 105, Gregory Crescent, S.E.9 (July 7).

Middx. 108, Selbourne Road, Tottenham, N.17; 62 Grant's Close, Mill Hill, N.W.7; 17, Malvern Terrace, Edmonton, N.9; 15, Kennard Road, Friern Barnet (July 7).

Notts. Chapel Farm, Cottam, Retford (July 7).

Oxford. Castle Farm, Churchill (July 5).

Salop. Shawbroom Farm, Cheswardine, Market Drayton (July 6).

Suffolk. Hill Farm, Rendham, Saxmundham (July 4).

Surrey. 1, Heath Cottages, Little Heath Lane, Cobham (July 4); Brickbarn Farm, Newchapel, Lingfield; Churt Place Farm, Churt, Farnham (July 5); 18, Kingswood Road, Wimbledon; Hazledene, South Lane, Ash (July 7).

Sussex. 42, Taylors Field, Midhurst; West Side Bungalow, Tillington, Petworth (July 4); 121, Moor Farm, Midhurst (July 7).

Swine Fever

Bucks. Littlewood, Woodend, Marlow (July 6).

Cambs. Randswood Farm, West Wratting, Cambridge; Croft House, Hasse Road, Soham, Ely (July 8).

Ches. Bickley Rown Farm, Bickley, Malpas (July 7).

Denbigh. Fferm Farm, Ruthin (July 4).

Derby. Park Hall Farm, Spinkhill, Renishaw (July 5); Barms Farm, Fairfield, Buxton (July 6).

Devon. Little Ley, Upton Pyne, Exeter (July 4); Haldon Lodge, Kennford, Exeter (July 6).

Flints. The Piggeries, Trellewelyn Farm, Rhyl (July 6); Hottia Farm, Dyserth (July 8).

Hereford. Durstone Farm, Pencombe (July 4).

Kent. Fleet Court Farm, Manston, Ramsgate (July 9).

Lancs. 52a, Wigan Road, Skelmersdale, Ormskirk; Abbey Farm, Burscough, Ormskirk (July 4); Cow Lee Farm, Bolton Road, Westhoughton, Bolton (July 11).

Lincs. Harris' Yard, School Lane, Mill Road, Springthorpe, Gainsborough (July 6); Causeway House, Wyberton, Boston (July 8); Poplar Farm, Nettlesham, Lincoln (July 11).

Monmouth. Coed-y-Gric Farm, Griffithstown, Pontypool (July 7).

Norfolk. Middle Farm, Corkway Drove, Hockwold, Thetford (July 4).

Northants. Lodge Farm, Barby (July 4); Middle Farm, Chelveston, Wellingborough (July 11).

Notts. Holly House Farm, South Scarle, Newark (July 11).

Salop. R.A.F. Station, Cosford, Wolverhampton (July 7).

Staffs. Captain's Barn Farm, Hulme, Weston Coyney, Stoke-on-Trent (July 7); Steelhouse Farm, Rudyard, Leek (July 8).

Stirling. Newpark Farm, St. Ninians; No. 1 Holding, Auchenreoch, Milton of Campsie, Glasgow (July 8).

Suffolk. Rookery Farm, Sproughton, Ipswich (July 6).

Warwicks. South Farm, Whitnash, Leamington Spa (July 4); 114, Gracemere Crescent, Hall Green, Birmingham; Alma Croft Farm, High Street, Warstock, Birmingham, 14; Snowford Grange, Long Itchington, Rugby (July 5).

Worcs. 2, Newland Crescent, Rushwick (July 4).

Yorks. Top Farm, Dinnington, Sheffield (July 5); Park Farm, Monk Fryston, Leeds (July 8); 134, Woodside Lane, Sheffield, 3 (July 11).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

THE TSETSE PROBLEM IN SOUTHERN RHODESIA

Sir,—I take this opportunity to support the contentions of Mr. L. E. W. Bevan in your issue of May 28th, as to the folly and cruelty of the present slaughter of wild game policy with the idea of eliminating tsetse fly. The policy has been a ghastly failure and its cruelty and the unnecessary suffering involved are no credit to Southern Rhodesia. I had much to do with the tsetse eradication in the Gold Coast and this slaughter policy was tried in connection with the attempted control of *G. sub-morsitans* but was not successful. However, research work into the problem was regarded as primary and the creation of the West African Trypanosomiasis and Tsetse Research organisation might well be copied in the new Central African Federation.

May I suggest that the Southern Rhodesian veterinary authorities might consider the experimental import into their tsetse areas of some of the highly resistant West African Shorthorn cattle as a positive measure to maintain cattle in tsetse infested areas. The hardy N'Dama breed of these cattle, which are indigenous to French Guinea, is the most likely type to do well.

I am convinced that the final answer to the tsetse problem lies in the eradication of the fly and not in preventive drug therapy. It seems incredible that the Rhodesian Trypanosomiasis Committee should oppose research as it is research only which will solve the problem of the eradication of flies of the *G. morsitans* group. My own experience convinces me that research must be carried out wherever tsetse exist as local conditions vary so much, *vide* the statement which Mr. Bevan quotes where a member of the profession is stated to have said that research in Southern Rhodesia is unjustified because all the research necessary was being performed in other territories. Tsetse research is absolutely necessary in Southern Rhodesia owing to the failure of the present barbaric methods and the increase in the spread of both the fly and of trypanosomiasis.

Yours faithfully,

J. L. STEWART.

P.O. Magoebaskloof,
North Transvaal.

July 4th, 1955.

"A WELL OF ENGLISH UNDEFILED"

Sir,—While not wishing to prolong the correspondence on the above subject I think that even Mr. Crosfield must agree that the words "anticipate" and "expect" are not simple alternatives. Jack and Jill expected marriage: it was very improper of them if they anticipated it.

Yours faithfully,

D. D. OGILVIE.

Fulshaw Hall,
Wilmslow,
Manchester.

July 11th, 1955.

Sir,—When I was Editor to the Physical Society an author sent in a paper containing the expression "the data *is* . . ." I corrected this and sent the paper to the printer. In revising the proof the author altered my "are" back to his "is," and naturally I deleted his alteration. Two days later there was a tremendous hammering at my front door at 2 o'clock in the morning. My author had just discovered that he had been wrong and sent a telegram by special messenger all the way from the City to say so.

Yours faithfully,

C. W. HUME.

284, Regent's Park Road,
Finchley,
London, N.3.

July 13th, 1955.

ADVERTISERS' ANNOUNCEMENTS

BURROUGHS WELLCOME & Co., announce that as from July 1st, 1955, "Themalon," their Canine Analgesic and Hypnotic, comes under the control of the Dangerous Drugs Act, 1951.

IMPERIAL CHEMICAL (PHARMACEUTICALS) LTD., wish to announce that they have now introduced "Siopel" Cream, a new skin protective which incorporates a specially selected silicone fluid. It can be used as a barrier cream when making rectal examinations, etc., and in surgery to prevent inflammation and excoriation of the skin around the wound during the immediate post-operative period.

The cream is issued in tubes of 50 grammes and containers of 500 grammes.